Use of Iodised Salt in the Households of Students of Government Middle Schools of the National Capital Territory of Delhi

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International Council for Control of Iodine Deficiency Disorders (ICCIDD); Regional Office for South Asia & Pacific

Centre for Community Medicine
All India Institute of Medical Sciences
New Delhi - 110029, India

IDD Delhi Report No. 2.

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The International Council for the Control of Iodine Deficiency Disorders (ICCIDD) is a non-profit non governmental organization dedicated to the sustainable elimination of Iodine Deficiency Disorders (IDD) throughout the world. The ICCIDD was granted an official status as an International NGO at the 47th World Health Assembly held in Geneva in 1994. It's activities are supported by donations/grants from the Australian Agency for International Development (AusAID), the Canadian International Development Agency (CIDA), the Micronutrient Initiative (MI), the Netherlands Ministry for Development Cooperation, the Swedish International Development Agency (SIDA), the United Nations Children's Fund (UNICEF), the United States Agency for International Development (USAID), the World Bank, the World Health Organization (WHO), and others.

Use of Iodised Salt in the Households of Students of Government Middle Schools of the National Capital Territory of Delhi

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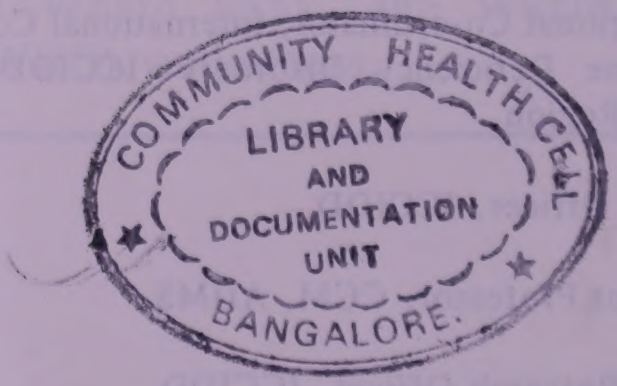

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TO THE GLOBAL PARTNERSHIP
DEDICATED TO THE ELIMINATION OF
IODINE DEFICIENCY DISORDERS

An Ancient Scourge of Mankind

The People of the affected countries
The Governments of the affected countries
The Salt Producers of each country
The International Agencies-especially
The World Health Organization
The United Nations Children's Fund
The World Bank
The Micronutrient Initiative
Kiwanis International
Program Against Micronutrient Malnutrition

The International Expert Network of
International Council for Control of
Iodine Deficiency Disorders
(ICCIDD)

The Bilateral Agencies especially
The Australian Agency for International Development
The Canadian International Development Agency
The Netherlands Ministry for Development Cooperation
The Swedish International Development Agency
The United States Agency for International Development

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डा० ललित मोहन नाथ
एम.डी, एम.एस, डा० पी.एच, एफ आई ए पी एस एम
संकायाध्यक्ष

Dr. LALIT M. NATH
MD, MS, Dr.PH, FIAPSM
DEAN.

संख्या / No. _____

दिनांक / Date _____

Foreword

22 nd March, 1996

It was a pleasure to read this report on "Use of Iodised Salt in the Households of Students of Government Middle Schools of National Capital Territory of Delhi". Iodine Deficiency Disorders (IDD) are a major cause of preventable mental retardation and other avoidable morbidity and mortality in the country. It was the study by Dr. Pandav and his team in seventies that highlighted the existence of IDD in Delhi. This prompted the ban on sale of uniodised salt in Delhi.

Considering the fact that iodine deficiency affects the educability of children, it is only appropriate that schools are also involved in this fight against IDD.

The Centre for Community Medicine is committed to exploring all governmental and non governmental systems for public health action. Involving the teachers and schools students in monitoring the iodine content of salt is indeed a good idea.

Lalit M Nath

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Acknowledgements

This project could not have been carried out without the co-operation of the school children studied, the support of the school principals and teachers. We are grateful to them.

We are also thankful to the Secretary, Department of Education, Ministry of Human Resource Development, National Capital Territory of Delhi for granting permission to conduct this survey in Delhi schools.

We are grateful to Prof. Lalit M. Nath, Director, All India Institute of Medical Sciences (A.I.I.M.S.), and Professor & Head, Centre for Community Medicine (CCM); all the Faculty & Staff Members of CCM for the keen interest and the support extended for carrying out this project.

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Dr. Chandrakant S. Pandav was trained as an International Clinical Epidemiology Network (INCLEN) Fellow (Health Economics; Level - II) at the Department

of Clinical Epidemiology and Biostatistics and Centre for Health Economics and Policy Analysis (CHEPA), at McMaster University, Hamilton, Ontario, Canada. We would like to place on record our acknowledgement to the INCLEN Programme.

We are also thankful to Ms Veena, Mr. Ashok Negi for the office support and Mr. Pritam Singh Tanwar for the computer assistance.

We are also indebted to Dr. Rajesh Pandav and Ms Vandna Khare for their invaluable comments and suggestions in making this report.

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Executive Summary

Background Information

Iodine Deficiency Disorders (IDD) are an important cause of mental handicap and poor educability of children. Globally 1,570 million people are living in IDD endemic areas. In India, 270 million people are at risk and 79 million are affected by IDD. Provision of iodine, by iodine fortified salt is a proven and effective way of preventing IDD. India along with many other countries has been a signatory to the goal of "Universal Salt Iodisation by the Year 1995". This will help achieve the goal of "Elimination of IDD by the year 2000".

Objective

To detect the presence of iodine in salt samples on a monthly basis from households of the students of government middle schools in Delhi using iodine spot testing kits.

Methodology

Study Design : Descriptive study

Study Period : June 1994 - February 1995

Study Setting : School children of 30 government middle schools in Delhi who brought salt samples from home every month.

Sampling Methodology : 30 schools out of a total of 165 schools were selected on the basis of "probability proportion to size".

Work Schedule : A preparatory visit was made to the officials of the Education Department of Delhi to inform them about the study and to seek their consent. A visit was then made to the schools to orient the Principal and the concerned teachers about Iodine Deficiency Disorders and seek their co-operation for the study. An informed written consent was taken from the principals of the schools. One section each from the classes VI to VIII of the selected schools were chosen randomly. The children were asked to bring salt from their homes on a prefixed day. On that day, the salt samples were examined for the presence of iodine by a spot testing kit. The results was immediately known to the students. This was repeated every month during the study (August '94 to Feb'95) among the same students in each school.

Results

A total of 16,596 salt samples were collected. Of this 12,736 (76.7%) tested positive for iodine and the rest 3,860 (23.3%) salt samples did not contain iodine. The proportion of children who brought the salt samples varied between 53% to 72% in different

months. As the study progressed, the trend was towards more samples being tested positive for iodine. The zonal differences were not significant.

Conclusions

1. Uniodised salt still continues to be available in the households of children studying in government schools in the National Capital Territory of Delhi.

2. The current monitoring system needs to be strengthened so as to keep a check on the sale of uniodised salt in the capital.

3. The use of rapid testing kits in schools is a practical and feasible way to supplement the monitoring activities of the government.

Recommendations

1. The system for monitoring iodine content of salt should be streamlined and made more effective. Supplementary strategies like involvement of non governmental agencies and schools should be explored.

2. The present study used the spot testing kit which does not quantify the level of iodine in the salt. A further study using quantitative estimation methods should be done.

1

Introduction

Iodine is one of the essential elements required for the normal mental and physical well being of man. The human body requires around 150 micrograms of iodine every day, which works out to less than a teaspoonful (5gm) over a life span of 70 years.

Deficiency of iodine occurs when the daily intake, specially of food and water, does not fulfil the requirement of the body. This leads to an abnormal swelling in the neck called "goitre" and other spectrum of disorders now collectively referred to as Iodine Deficiency Disorders (IDD) (1). The full spectrum of IDD is shown in Table -1.1. Lack of iodine can cause irreparable harm even before birth. Mothers who are deficient in iodine may have frequent abortions and give birth to stillborn babies. The children born to such mothers are at a greater risk of dying during the first year of life. Those who survive can be permanently crippled with varying degrees of mental handicap and physical deformity, commonly referred to as endemic cretinism.

Iodine deficient children suffer from tardy concentration, impaired co-ordination and sluggishness, which results in poor school performance. In addition,

their energy and productivity are also adversely affected. It has been estimated that, on an average, school children living in iodine deficient areas have an IQ level about 13 points lower than that of children living in iodine sufficient areas (2). Thus, the total accumulated loss to the country is formidable.

Farm animals are also equally at risk to the spectrum of IDD at all stages of growth and development, from conception to adult physical performance in farm animals. Reproductive failure is the outstanding manifestation of iodine deficiency in farm animals. Fetal development may be arrested at any stage, leading to either death and resorption, abortion and stillbirth, or the birth of young ones that are weak, often associated with prolonged gestation and retention of fetal membranes. More kids are born to iodine sufficient goats and the probability of survival in kids born to iodine sufficient goats is twice that of those born to iodine deficient goats (3). In addition, to the reproductive disturbances described, infertility, in both male and female farm animals in iodine deficient areas, has been associated with goitre and shown to respond to iodine therapy.

Table 1.1 *The spectrum of Iodine Deficiency Disorders.*

Stage in Life	Health Effects
Fetus	Abortions Stillbirths Congenital Anomalies Increased Perinatal Mortality Increased Infant Mortality Neurological Cretinism: - mental deficiency - deaf-mutism - spastic diplegia - squint Myxedematous cretinism: - mental deficiency - dwarfism Psychomotor defects
Neonate	Neonatal goitre Neonatal hypothyroidism
Child and Adolescent	Goitre Juvenile hypothyroidism Impaired mental function Retarded physical development
Adult	Goitre with no complications Hypothyroidism Impaired mental function

2

Magnitude of Iodine Deficiency Disorders (IDD)

2.1 World

Iodine deficiency is the world's single most significant cause of preventable brain damage and mental retardation. A total of 118 countries in the world are reported to have IDD problem. It is estimated that 1,570 million people are at risk of iodine deficiency in the world today, constituting 29% of the world's population. Globally the prevalence of goitre is estimated to be 12%. The number of subjects affected by goitre is now estimated to be 655 million and 300 million suffer from lowered mental ability. Because of iodine deficiency in their mothers, at least 30,000 babies are stillborn every year and over 120,000 are born cretin, physically stunted, deaf-mute or paralysed (4). Thus, IDD is a significant public health problem in the world.

2.2. India

India is the second most populous country in the world with a population of 834 million (1991 census). High prevalence of goitre and cretinism exists in a broad Himalayan and sub-Himalayan goitre belt, from Jammu & Kashmir in the west, to Arunachal Pradesh in

the east and, along this entire length, extending at least 500 kms south of the Himalayas into the flat sub-Himalayan terai (plains).

In addition to the well known "Himalayan endemic belt", iodine deficiency has been reported from many other states in the country. In 1989, the Indian Council of Medical Research (ICMR) carried out a multicentric IDD prevalence study. Nine states outside the traditional "Himalayan goitre belt" were studied for the prevalence of goitre and cretinism. A total of 409,923 individuals were examined. Overall goitre prevalence observed was 21.1 percent and the overall cretinism prevalence was 0.7 percent (5).

In India, it is estimated that 270 million people are at risk. 79 million have goitre (6), 2.2 million are cretins and 6.6 million have mild neurological disorders. Out of the 457 districts in India, 239 districts have been surveyed by the Government of India/State Governments. Of these, 197 districts are endemic for goitre.

This places India among the major endemic iodine deficiency countries of the world. Immediate steps are therefore required to ensure that iodine supplementation, in some form, reaches all the afflicted populations, at the earliest.

2.3 Delhi

A survey carried out by the Goitre Control Cell, Ministry of Health & Family Welfare, Government of India in 1975-78, reported a goitre prevalence of 29% amongst school children (6). Subsequently in a study by Pandav et al (9) in 1980, 3,200 school children in two schools in Kalkaji and Chandni Chowk were examined for goitre and urinary iodine excretion was measured. The total goitre rate (TGR) was 55% and more than 60% students had urinary iodine less than 50 µg/gm of creatinine. In a subsequent survey in 1988 by Sharma et al (10), 27,890 school children were examined. This survey was planned to be the baseline survey for assessing the impact of future interventions. The prevalence of goitre was 23.8% in girls and 17.3% in boys, and 62.5% students had urinary iodine levels of less than 50 µg/gm of creatinine.

Based on these surveys, the Government declared Delhi to be an IDD endemic area. The sale of uniodised salt was banned with effect from 1st June 1989. To assess the impact of supply of iodised salt in Delhi in last five years, a survey was recently done in 30 government schools selected on the basis of PPS. The survey covered 1,657 students of class VI of the selected government schools. The total goitre prevalence was 19.7% and the median urinary iodine level in samples was 198 µg/l (5). This indicates that though IDD rates are declining, it still continues to be a public health problem in Delhi.

3

National IDD Control Programme

3.1 Salt Iodisation

All the methods of prevention of IDD are based on supplementation of iodine in different ways. This includes fortification of different foodstuff like salt, bread, sauce, tea, milk etc. with iodine, iodised water or the use of iodised oil. Of the two most common methods of iodine supplementation - iodised salt and iodised oil (injection or oral capsules) - the former is widely practised.

The Government of India launched the National Goitre Control Programme (NGCP) in 1962. The Programme adopted the strategy of iodisation of edible salt. This programme was renamed the National Iodine Deficiency Disorders Control Programme (NIDDCP), in June 1992 in recognition of the spectrum of disorders caused by iodine deficiency.

The Salt Commissioner's Office located at Jaipur (Rajasthan State), is responsible for ensuring the supply of iodised salt. Initially, iodised salt supply was started as an area-specific programme i.e. only those areas where IDD was reported, as a public health problem, received iodised salt. However, the restriction on sale of uniodised salt in these specific areas was

administratively difficult. Additional surveys done by the Ministry of Health, Government of India, State Governments, Indian Council of Medical Research (ICMR), Medical Colleges and Home Science Universities indicated that the problem of IDD was prevalent all over the country. Hence, it was decided to launch a Universal Salt Iodisation (USI) programme.

In India, the average consumption of salt is 10 gm per person per day. The minimum recommended daily intake of iodine is 150 μg. To provide this amount, it is recommended that salt should contain iodine in levels of 15 parts per million (ppm) [15 mg iodine / kg of salt] at the household level. To compensate for the loss during transportation and storage, the iodine level at production is set at 30 ppm (30 mg iodine / kg of salt). These levels of iodine, both at production and consumption levels, are specified in the Prevention of Food Adulteration Act (1954).

3.2 Quality Control

The success of the National Iodine Deficiency Disorders Control Programme depends primarily on the iodine level in salt at the consumer level. For an effective salt iodisation programme, monitoring the levels of iodine at different stages i.e. from production to consumption is one of the most important factors. Under the NIDDCP, the responsibility of quality control of iodised salt in India has been entrusted to the Salt Department. However, due to lack of trained staff,

funds and laboratories, regular monitoring is currently restricted to the major producers of iodised salt.

3.2.1. Prevention of Food Adulteration Act

The sale of uniodised salt has been banned by issuing Notifications under Section 7 (clause iv) of Prevention of Food Adulteration (PFA) Act, by the state governments within their territories either in full or in part. The qualities of iodised salt have been specified under the provision of item A.15.01 of Appendix B of PFA Rules, 1954 (Annexure 11.7). Presently, the ban is applicable only to the salt meant for human consumption. It is not applicable to salt for animal consumption. Except for the state of Kerala, all the remaining states and union territories have issued ban notification orders.

Strict ban enforcement is as important and essential as the ban notification. The PFA Act is implemented by Food and Drugs Administration of the concerned states. The food inspectors are empowered to draw samples, in accordance with the procedure set out in the rules, and get them analysed in the designated laboratories. If a salt sample fails to meet the specifications, either in terms of iodine content or other characteristics, the foods inspectors are empowered to launch prosecution against the manufacturer/producer/retailer/seller of such substandard iodised salt. A successful prosecution could mean imprisonment which shall not be less than six months, but which may extend upto three years and a fine of not less than Rs. 1000.

Poor quality control during production and losses following production can prevent adequately iodised salt from reaching the consumer. In fact, this is the only stage where a corrective measure of re-iodising the inadequately iodised salt can be taken. There have been a number of instances where salt iodisation was initiated but not sustained, resulting in a return to previous levels of IDD endemicity. Sustained consumption of adequately iodised salt by all segments of population, requires continuous efforts to maintain quality, starting from production to its consumption in the household. Monitoring provides the necessary information from which key decisions about programme activities, such as adjustment in iodine levels and changes in transport conditions or storage procedures can be made.

Monitoring could be done at a number of levels and should be integrated with other activities. If the information indicates that iodine loss is taking place during transit from production to consumption, as a result of poor packaging or inappropriate storage and transport conditions, then corrective action can be taken to prevent the same. In addition, it is equally important to understand the socio-cultural practices related to use of salt before cooking. For example, in certain communities people wash their salt, dry it in sun and then use it for cooking. This leads to loss of iodine at the household level by the consumer. Thus all efforts made to make effectively iodised salt at consumption level are "washed out". The role of culturally relevant communication thus becomes very important. The aim of the monitoring at various levels

is to finally ensure that the iodised salt contains at least 15 ppm of iodine at the consumer level.

3.2.2 Monitoring at Production Level

Every iodised salt producer has to maintain an Iodine Monitoring Laboratory (IML), to ensure proper level of iodisation. Samples are drawn during the manufacture of iodised salt and analyzed. Whenever there is less iodine in the salt, corrective action is initiated by the salt producer. A second check is carried out by the Salt Department before the dispatch of salt by rail or road. Samples are drawn at random and analysed at the Salt Department's Quality Control Laboratories. Whenever any sample is found to be sub-standard, the producer concerned is asked to reprocess that batch of salt. Permits are cancelled in case of repeated failures.

The Salt Department has set up a total of 24 Quality Control Laboratories in seven states, at important iodised salt producing centres. These are staffed by qualified chemists.

These two stages of monitoring are expected to ensure that only iodised salt with specified iodine content is dispatched to the consumption centres.

3.2.3 Monitoring in Distribution Channel

Quality control at the retailer level is done by the State Governments through the Health Directorates.

The food inspectors of the concerned State Governments supervise the quality of iodised salt. If the samples are found sub-standard, all persons who have manufactured, distributed and sold the sub-standard iodised salt are liable to be prosecuted under PFA Act.

Evaluation of a number of IDD control programmes with iodised salt revealed that the major cause of the relatively low impact of iodised salt on goitre prevalence rates was the low level of iodine in the salt at the consumer level. Quality control of iodised salt at various levels, starting from the iodisation plant to the consumers has always been a neglected area.

Thus, careful monitoring and control of iodine levels at the production, storage, sale and consumption stages, and prevention of sale of uniodised salt are vital components of an effective salt iodisation programmes. Such systems should be an integral part of the programmes with variations introduced to suit local conditions and requirements. The information generated by the monitoring mechanism should be directly linked to decision making and the necessary built-in feedback system should be introduced.

3.3 Iodised Salt Supply in Delhi

The total projected population of Delhi for the year 1994 is 10,145,000. The annual requirement of salt for Delhi is 61,000 million tonnes. Salt for Delhi mainly comes by rail and road from Rajasthan and

Gujarat. The zone wise distribution as well as mode of transport is given in Table 3.1.

Table 3.1 *Zone wise distribution of salt received by Delhi*

Zone	**Rail** Quantity ('000 tons)	**Road** Quantity ('000 tons)	**Total** Quantity ('000 tons)
Rajasthan	18.24	3.54	21.78
Gujarat	93.48	--	93.48
Total	111.72	3.54	115.26

The total supply in 1994 has been 2,16,100 tonnes, out of which, supply by different modes was:- 2,12,800 tonnes by rail and 3,300 tonnes by road.

Against the annual salt requirement of Delhi, a much larger quantity of iodised salt is supplied and accordingly extra provision has been made against Delhi in the zonal scheme. In fact Delhi acts as the nodal point for supply of iodised salt to Haryana, Punjab, Himachal Pradesh, Chandigarh U.T. and occasionally to Jammu & Kashmir. This secondary movement of iodised salt from Delhi to the states mentioned is not monitored by the Salt Commissioner's office and therefore this is not accounted for in the records. As a result of this, the actual movement of salt to the northern states of Punjab, Haryana, Chandigarh, Himachal Pradesh and Jammu & Kashmir also does not get correctly reflected in the record.

Use of Iodised Salt in Delhi

Large quantities of unaccounted salt are transported by road from Delhi to the western border districts of Uttar Pradesh.

There is also a large scale movement of non-iodised salt by road to Delhi, both by the licensed and non-licensed salt manufacturers in Rajasthan and Gujarat, in the name of salt required for industries. A part of it finds its way into the edible salt market.

4

Objective

To detect the presence of iodine in salt samples on a monthly basis from households of the students of government middle schools in the National Capital Territory of Delhi using iodine spot testing kits.

5

Methodology

Study Design : Descriptive study

Study Period : June 1994 to May 1995

June 1994 and July 1994 : This period was spent in planning and preparatory meetings with officials of the Departments of Education, National Capital Territory (NCT) of Delhi.

August 1994-February 1995 : Testing of salt samples.

March 1995-May 1995 : Analysis of data and preparation of the report.

Study Population : School children from 30 government middle schools, collected salt samples from their homes and brought them to school for analysis.

Sampling Methodology : A complete list of all the government middle schools in Delhi with the number of students enrolled in middle school was made. There are a total of 165 government middle schools. 30 schools were selected on the basis of "probability proportion to size"(PPS). The list of the schools selected is given in Annexure—11.1.

Work Schedule : A preparatory visit was made to the officials of the Education Department of Delhi to inform them about the study objectives and to seek their approval for conducting the study. A visit was then made to each school to orient the Principal and the concerned teachers about Iodine Deficiency Disorders and seek their co-operation for the study. An informed written consent was taken from the principals of the schools. One section each from the classes VI to VIII of the selected schools were chosen randomly. The children were then asked to bring salt from their homes on a fixed day. On that day, the salt samples were examined for the presence of iodine by a spot testing kit. The results was immediately known to the students and teachers. This exercise was repeated every month during the study period (August 1994 to February 1995) among the same students in each school.

Data Analysis : The results were entered in the computer and analysed with the help of EPIINFO package.

Dissemination of Results : Monthly reports of the results were sent to the school principals and officials of the Education Department.

6

Results

The list of schools selected is given in Annexure—11.1. A total of 3,719 students participated in this study. The distribution by the zones is given in Tables—6.1. East zone (45.8%) had the maximum number of students and south zone (3.5%) had the least number of students.

Table 6.1 *Distribution of schools and students by zones*

Sr. No.	Zone	Number	Total No. of Students (%)
1.	North	6	753 (20.2)
2.	South	1	130 (3.5)
3.	East	13	1,702 (45.8)
4.	West	5	569 (15.3)
5.	Central	5	565 (15.2)
6.	Total	30	3,719 (100.0)

Salt was tested for seven months from August 1994 to February 1995. As is evident from Table - 6.2, the response rate declined from 71% in the initial months to about 50 - 60% in the last few months. This decline could be due to waning interest in the project as time passed. Also, in the later months due to the

proximity of examinations, students and teachers would be less likely to remember to bring salt.

Table 6.2 *Collection rate of salt samples at different months*

Month	Total Students	Salt Samples Collected (%)
August	3,719	2,643 (71.1)
September	3,719	2,651 (71.3)
October	3,719	2,427 (65.3)
November	3,719	2,491 (67.0)
December	3,719	2,214 (59.5)
January	3,719	2,003 (53.9)
February	3,719	2,167 (58.3)
Total	26,033	16,596 (63.8)

The salt samples brought by the students were tested by a spot testing kit for the presence of iodine. The kit was a qualitative kit and hence the quantification of iodine level were not done. Of the total 26,033 samples possible over the seven months period, 16,596 (63.8 %) samples were actually tested. Iodine was present in 76.7% of salt samples as shown in Figure 6.1. As is evident from Table 6.3 and Figure 6.2, the best results were obtained from the south zone where 87.7% of the salt samples tested positive for iodine. The salt samples from central zone had the least number (70.2 %) of samples with iodine in them. When analysed by the month, it was seen that the number of iodine positive salt samples increased from a low of

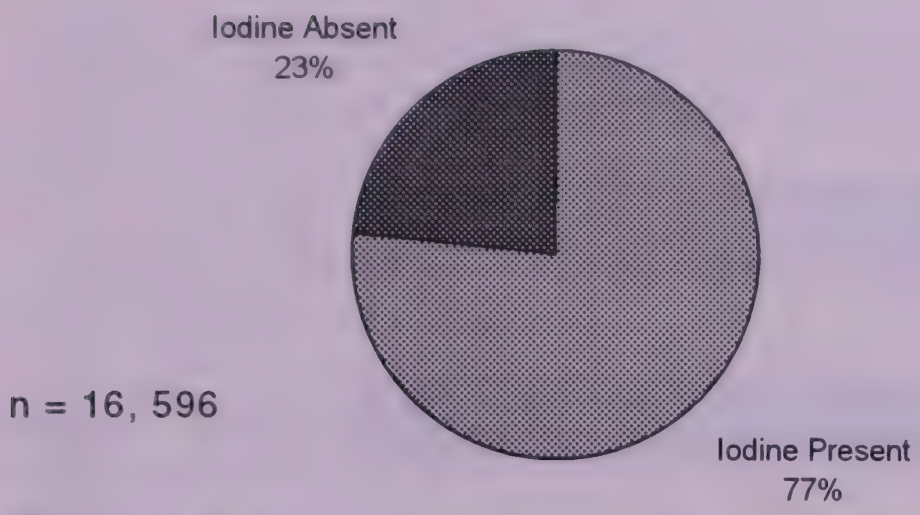

Figure 6.1 Presence of iodine in salt samples collected from households of school children in Delhi, from August 1994 to February 1995.

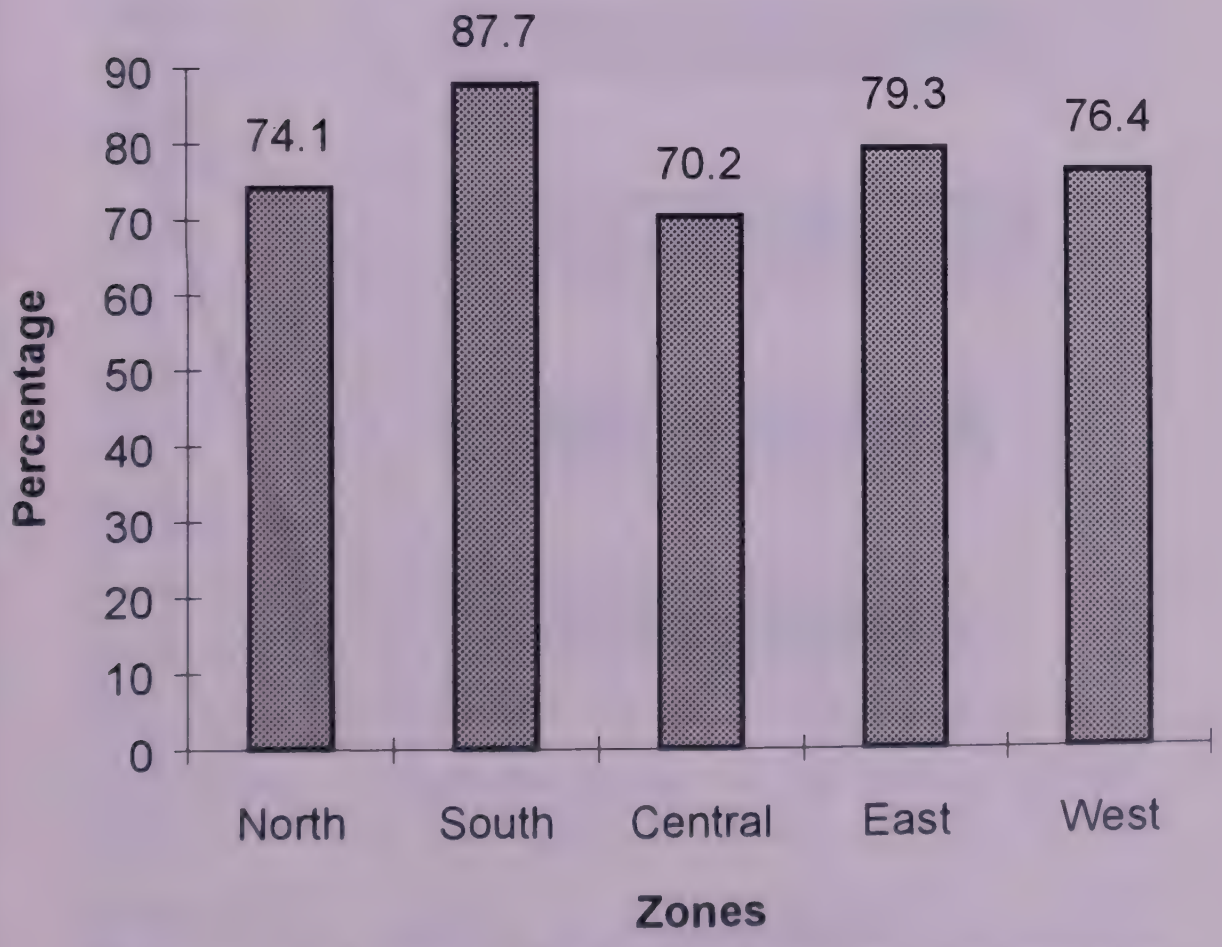

Figure 6.2 Presence of iodine in salt samples collected from households of school children from different zones of Delhi.

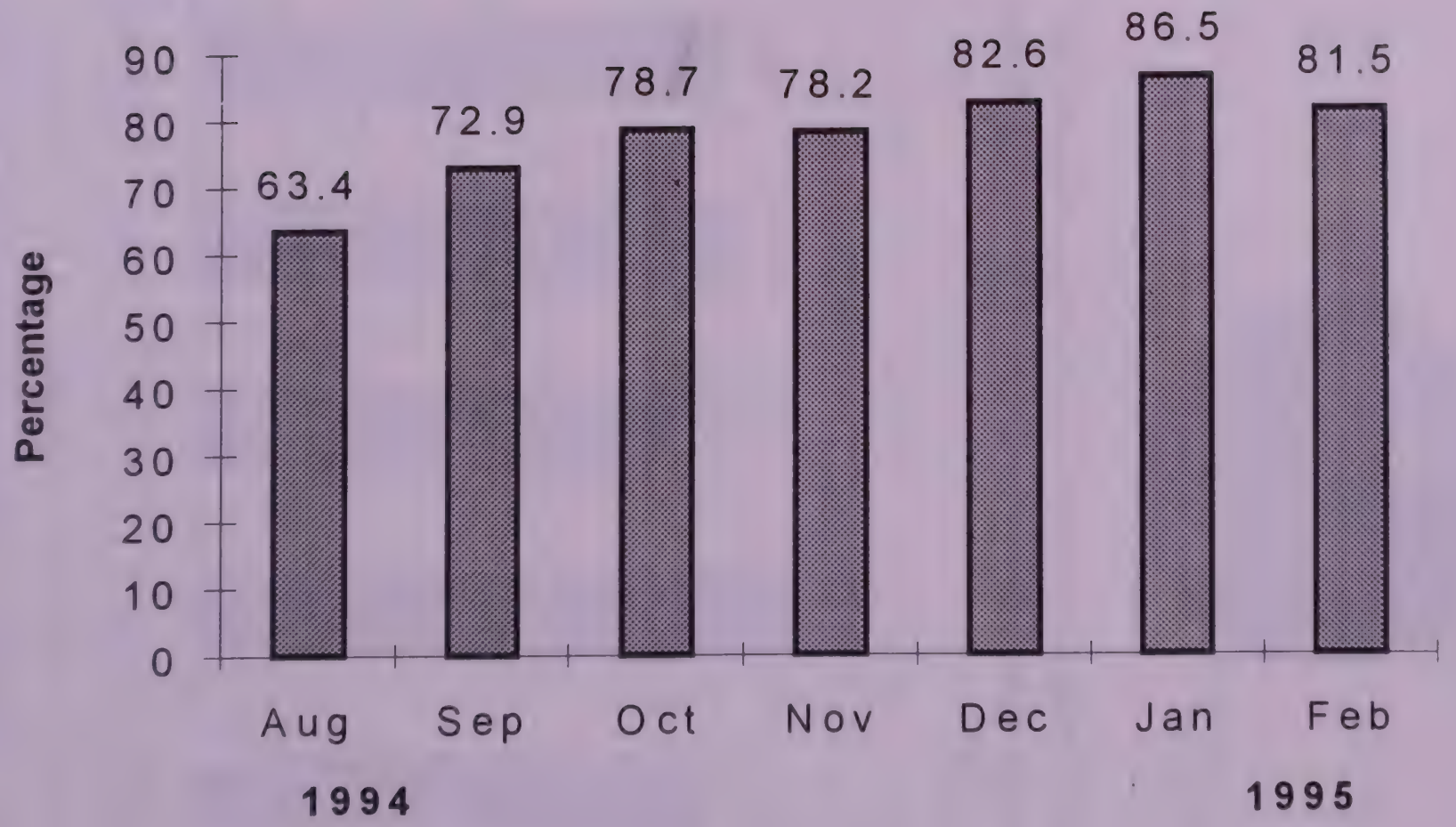

Figure 6.3 Presence of iodine in salt samples collected from households of school children of Delhi, in different months.

63.4% in August '94, to a peak of 86.5% in January '95, and then came down to 81.5% in the month of February '95.

Table 6.3 *Presence of iodine in the salt samples tested at difference zones.*

Zone	Iodine Present (%)	Iodine Absent (%)	Total
North	2,589 (74.1)	903 (25.9)	3,492
South	391 (87.7)	55 (12.3)	446
Central	1,694 (70.2)	718 (29.8)	2,412
East	6,328 (79.3)	1,650 (20.7)	7,978
West	1,734 (76.4)	534 (23.6)	2,268
Total	12,736 (76.7)	3,860 (23.3)	16,596

Table 6.4 *Presence of iodine in the salt samples tested during different months of the study period.*

Month	Iodine Present (%)	Iodine Absent (%)	Total
August	1,676 (63.4)	967 (36.6)	2,643
September	1,932 (72.9)	719 (27.1)	2,651
October	1,911 (78.7)	516 (21.3)	2,427
November	1,949 (78.2)	542 (21.8)	2,491
December	1,829 (82.6)	385 (17.4)	2,214
January	1,673 (86.5)	330 (13.5)	2,003
February	1,766 (81.5)	401 (19.5)	2,167
Total	12,736 (76.7)	3,860 (23.3)	16,596

7

Discussion

The results show that uniodised salt continues to be available in the households of government school children of Delhi. It is apparent that the monitoring mechanism needs strengthening. It is however encouraging that about three fourths of the salt samples had iodine in them. However, as no quantitative test was performed, it is not possible to say whether those salt samples which tested positive for iodine had the recommended levels of iodine at household level i.e. 15 ppm.

During the study period the number of salt samples which tested positive for iodine increased from about 60% in August '94 to about 80% in later months. This increased trend could be due to three reasons :

i) The awareness of iodised salt increased during the study period resulting in increased use of iodised salt.

ii) As the results of the salt test were known to everybody in the class, the students bringing uniodised salt could have felt embarrassed and hence stopped bringing salt for future analysis. The possibility of selective non response is to some extent supported by the decline in response rates over the study period.

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iii) The third possibility is that the students could be sharing salt samples, especially those whose samples tested negative may have taken a sub sample from those whose salt samples tested positive for iodine.

The continued availability of uniodised salt in Delhi despite the ban could be due to the following reasons :

i) Due to poor quality control and monitoring, the salt which is labelled as iodised does not contain iodine.

ii) Uniodised salt continues to enter the market either by road or by rail.

iii) It was seen during the study that in a school in the rural area of east Delhi, rock crystal salt was being used in the households. Due to the big size of the crystals this salt can not be iodised effectively. Furthermore, users often wash salt before use, losing whatever little iodine is present in it.

iv) The Government of Delhi has banned the sale of uniodised salt for human consumption only and not those salts which are meant for animal consumption. This means that both kinds of salt are available in the market and the uniodised salt being cheaper is more likely to be bought by a not so knowledgeable consumer.

The problems which were encountered during the survey and the strategy adopted to solve them were as follows :

(i) Forgetfulness on the part of teachers / principals to remind students to bring salt a day before the scheduled day of visit.
Despite evolving a systematic mailing scheme, several other possible options were explored and applied to avoid any possible lapses in smooth functioning of survey such as adopting a fixed day / date strategy which worked out very well. Also, the visits were confirmed telephonically a day prior to the visit. In the month of December, a time table with logos and slogans, reminding children of the importance of bringing salt every month, were distributed as reminders to the students.

(ii) Skeptical views of teachers regarding the utility of the survey and its outcome.
Based on their past experience with such surveys, the teachers and principals were skeptical of the utility of such surveys. An effort was made to make school authorities recognize the fact that the survey work has been initiated with the consent and co-operation of the Education Department. They were also told that, both the higher authorities and the schools would be informed of the survey results on a monthly basis. The final report would also be submitted to them. This improved the credibility of the survey to a large extent.

The school authorities were also informed that the results would be presented before the decision makers, so as to enable them to understand the extent of the problem, so that they take necessary and timely steps for its control.

(iii) Problems arising due to the nature of intra-institutional (school) relationships :
This factor is of great importance as it is the sole determinant of the sincerity of the efforts of school staff in reminding each other and students about the visit and the importance of getting salt tested every month. It was observed that school staff, who were convinced of the credibility and applicability of the survey turned out to be co-operative. But a few of them, despite repeated persuasion, did not co-operate fully.

(iv) Cognizance of the mere fact that the survey was being conducted by a premier medical institution, the All India Institute of Medical Sciences, proved to be a facilitative factor.

(v) Children distributing salt among each other and thus making its veracity questionable.
Though the extent of this problem can not be quantified, attempts were made to minimise this by repeated instructions and explanations of implications associated with such acts.

(vi) Unprecedented holidays disturbed the scheduled visits. This was overcome by making a repeat visit after prior consultation with the schools.

8

Conclusions

1. Uniodised salt still continues to be available in the households of children studying in government schools of the National Capital Territory of Delhi.

2. The current monitoring system needs to be strengthened so as to keep a check on the sale of uniodised salt in the capital.

3. The use of rapid testing kits in schools is a practical and feasible ways to supplement the monitoring activities of the government.

9

Recommendations

1. The systems for monitoring iodine content of salt should be streamlined and made more effective.

2. Supplementary strategies like the involvement of non governmental agencies and schools should be explored.

3. The present study used the spot testing kits. Though this is an easy method of testing salt samples of iodine, it does not quantify the level of iodine in the salt. This means a salt sample which has been tested positive, can still have inadequate iodine levels. A further study using quantitative estimation methods should be done.

4. More research is needed to identify the source and route of entry of uniodised salt in Delhi. Also it is essential to find out whether the availability of uniodised salt for animal use results in it being used for human use too. If so, it is necessary that the ban is extended to include salt meant for animal consumption.

10

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11

Annexures

11.1. List of Schools Selected for Iodine Estimation in Salt.

District North

1. Govt. Boys Sr. School, No. 1, Keshav Puram
2. Govt. Boys Sr. School, No. 1, Shakarpur
3. Govt. Boys Sr. School, Pratap Nagar
4. Govt. Boys Sr. School, No. 2, Shakarpur
5. Govt. Boys Sec. School, J.J Colony, Wazirpur
6. Govt. Boys Sr. School, Shakarpur

District Central

7. Govt. Boys Middle School, Mubarakpur Dabas
8. Govt. Boys Middle School, (Urdu Medium), Tagore Road
9. Govt. Boys Middle School, Ram Nagar - I
10. Govt. Boys Middle School, Ramjas Lane - I
11. Govt. Boys Middle School, Ramjas Lane - II

District East

12. Govt. Girls Middle School, East of Loni Road, DDA Flats.
13. Govt. Boys Middle School, Mustafabad
14. Govt. Girls Middle School, Mustafabad
15. Govt. Co-ed. Middle School, Khajuri Khas
16. Govt. Girls Middle School, Vijay Park, Mauj Pur
17. Govt. Co-ed. Middle School, Jafrabad
18. Govt. Girls Middle School, Teliwar
19. Govt. Girls Middle School, Jhilmil Colony

20. Govt. Girls Middle School, Circular Road
21. Govt. Co-ed. Middle School, School, Vishwas Nagar
22. Govt. Co-ed. Middle School, School Block, Shakarpur
23. Govt. Girls Middle School, Shivpuri
24. Govt. Boys Middle School, E Block, Krishan Nagar

District South

25. Govt. Boys Middle School, Pushp Vihar

District West

26. Govt. (Rural) Girls Middle School, Pandwala Khurd
27. Govt. (Rural) Boys Middle School, Baproda (Co-edn.)
28. Govt. (Urban) Boys Middle School, Ambika Vihar (Co-edn.)
29. Govt. (Urban) Boys Middle School, Ashok Nagar, Block 59
30. Govt. (Urban) Girls Middle School, Tilak Nagar, Block 24.

11.2. Letter to the Education Department for permission to conduct the study

Ref No.: IDD\DELHI\SCHOOL\2.94

Dt.: 11th July 94

Dear Sir,

Iodine Deficiency Disorders (IDD) is a major public health problem in India. Studies conducted over the last 15 years by the Ministry of Health and Family Welfare, Govt. of India and Centre for Community Medicine, A.I.I.M.S., New Delhi, and other agencies have highlighted the problem of IDD among school children of Delhi. The prevalence of goitre in these children varies between 13% to 75%.

The single most important cause of mental handicap in the world is iodine deficiency. It has also been proved the world over that children living in areas deficient in iodine have Intelligence Quotient (IQ) scores of upto 13 points less than those of children receiving adequate iodine. This can be very crucial in the formative years of schooling. Iodine deficiency in childhood can lead to mental retardation, delayed motor development, stunted growth, muscular disorders, paralysis, hearing and speech defects. These disorders interfere with development of the child. And yet all this is totally preventable.

Globally as well as in India, salt has proved to be the most effective medium of iodine supplementation. Since we universally consume salt in small fixed amounts daily, it is an ideal vehicle to deliver required doses of iodine to the population at large. Also, salt is one of the few commodities consumed by a

cross section of people regardless of economic level. Since iodine deficiency is due to environmental factors (iodine leached away from soil by glaciation, frequent flooding etc.), iodine supplementation has to continue life long.

The Govt. of NCT of Delhi has taken appropriate action by banning the sale of non-iodized salt for the prevention of IDD in Delhi since 1987. However, studies also show that monitoring is a vital part of the effort to eliminate IDD. If the iodine content of salt at the consumer's end is not monitored, then there could be a recurrence of IDD.

One of the ways of monitoring is to periodically test salt for iodine content. To be able to test salt for iodine, a simple salt testing kit has been developed. The kit contains a vial with a chemical solution. One drop of the chemical solution turns a salt sample from light blue to dark violet if it contains iodine.

Schools are an effective channel to reach the population at large. The child-to-child and child-to-community approach is universally acknowledged as an effective way to communicate with the community. We have, therefore, targeted schools to spread awareness about IDD. Since Delhi Administration covers a large number of schools, we are initiating a school based project to test iodine content of salt in selected schools of Delhi Admn, on a monthly basis. We shall keep you informed about the results of these tests regularly.

We request your support and co-operation to eliminate the scourge of IDD. This is an opportunity for us to make sure that children achieve the minimum levels of learning and improve their scholastic performance.

I am enclosing a copy of the book "S.O.S. For A Billion - The conquest of Iodine Deficiency Disorders" for your ready reference.

In case you require additional technical information, we will be pleased to provide the same.

Thanking you in anticipation,

Yours Sincerely,

Mr. Narendra Prasad
Secretary,
Deptt. of Education,
Medicine
Govt. of NCT of Delhi

(Dr. C.S. Pandav)
Associate Professor
Centre for Community

&
Regional Co-ordinator
ICCIDD (SEARO)

Copy to:

1) Mr. P.L. Tripathi, Director, Adult Education, Deptt. of Education, M.O.H.R.D.

2) Mr. Shakti Sinha, Director, Education, Old Secretariat.

3) Dr. G.L. Arora, Director, SCERT, Delhi Administration
Deputy Directors of Dehli Administration:

4) Mr. L.P. Verma (East),

5) Mr. Y.P. Puran (West),

6) Mr. S.N. Chatopadhyay (North),

7) Dr. T.P.S. Chauhan (South)

8) Mr. M.C. Mathur (Central).

11.3. Letter written to schools regarding the study

11.3.1

Dear Sir/Madam,

We at the Centre for Community Medicine, All India Institute of Medical Sciences, work in the area of Iodine Deficiency Disorders.

We are initiating a short-term project in selected Delhi schools on monitoring of iodine content in salt. We are enclosing a copy of the letter (Ref No. IDD\Delhi\school\2-94) sent to the Secretary, Deptt. of Education and other concerned officials of the Government of NCT of Delhi.

The project involves monthly testing of salt samples in one section each of classes 6,7 and 8. The children in each of the three sections would be required to bring a handful of salt from their homes which would be tested by them with the salt testing kit. The whole process would only take 10-15 minutes per section.

We would be giving monthly reports to each of the selected schools. We will also send the reports to all the senior officials at the Deptt. of Education (Govt. of NCT of Delhi) and Delhi Administration.

We look forward to working with you.

Thanking you in anticipation,

Yours sincerely,

(Dr. C.S.PANDAV)
Associate Professor

11.3.2

To,

The Principal

SUB: Date of visit for testing of salt.

Dear

At the outset, I would like to express my gratitude for the co-operation that you have accorded to us. We are also very thankful to the teachers of your school for helping us with this project.

As discussed in our previous meeting, we would be visiting your school on _____ to test salt samples for iodine content in the same sections as before. Kindly inform the respective class teachers to ensure that children bring the salt samples on that day i.e. _____

We look forward to continued co-operation from you.

Thanking you in anticipation,

Yours Sincerely,

(Dr. C.S.PANDAV)

11.4. Format of monthly report to the schools

CENTRE FOR COMMUNITY MEDICINE
ALL INDIA INSTITUTE OF MEDICAL SCIENCES
NEW DELHI - 110029
PHONE: 6863522

TESTING FOR IODINE IN SALT AMONG DELHI SCHOOLS

MONTHLY REPORT

Dated :

REPORT FOR THE MONTH OF:

TOTAL SALT SAMPLES ANALYSED	IODINE IN SALT			
	YES	NO	ABSENT*	TOTAL

*indicates that either the child was absent or did not bring salt sample for analysis.

Sr. No.	Zone	Name of the School	Total no. of students (Class VI + VII)

No.	Name of the School	Grand Total	Iodine + (%)	August		September		October	
				Total	Iodine + (%)	Total	Iodine + (%)	Total	Iodine + (%)

ROLL NO.	NAME OF THE STUDENT	IODINE PRESENT IN THE SALT SAMPLE (MONTH-WISE DETAILS)																					
		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR												

11.5. Communication material and time table distributed to the students

समय - सारणी
आयोडीन नमक
आयोडीन नमक
आयोडीन नमक
आयोडीन नमक
आयोडीन नमक का उपयोग करेंगे घर-घर
हर महीने नमक लाएँगे टेस्ट के लिए घर से भर कर
आयोडीन नमक है ऐसा जानूँ नमक
जो हमारी कुछ की है रक्षक
सख्यावकाश
आयोडीन नमक
आयोडीन नमक
हर दिन खाएँगे हम आयोडीन नमक
जो करे हमारी कुछ की वहन
आयोडीन नमक
दिन
घंटा
रविवार SUN.
शनिवार SAT.
शुक्रवार FRI.
गुरुवार THU.
बुधवार WED.
मंगलवार TUE.
सोमवार MON.
1 2 3 4 5 6 7 8

11.6. Photographs

Students displaying the iodised salt logo & time table distributed to them

Students displaying the salt which they had brought from their houses.

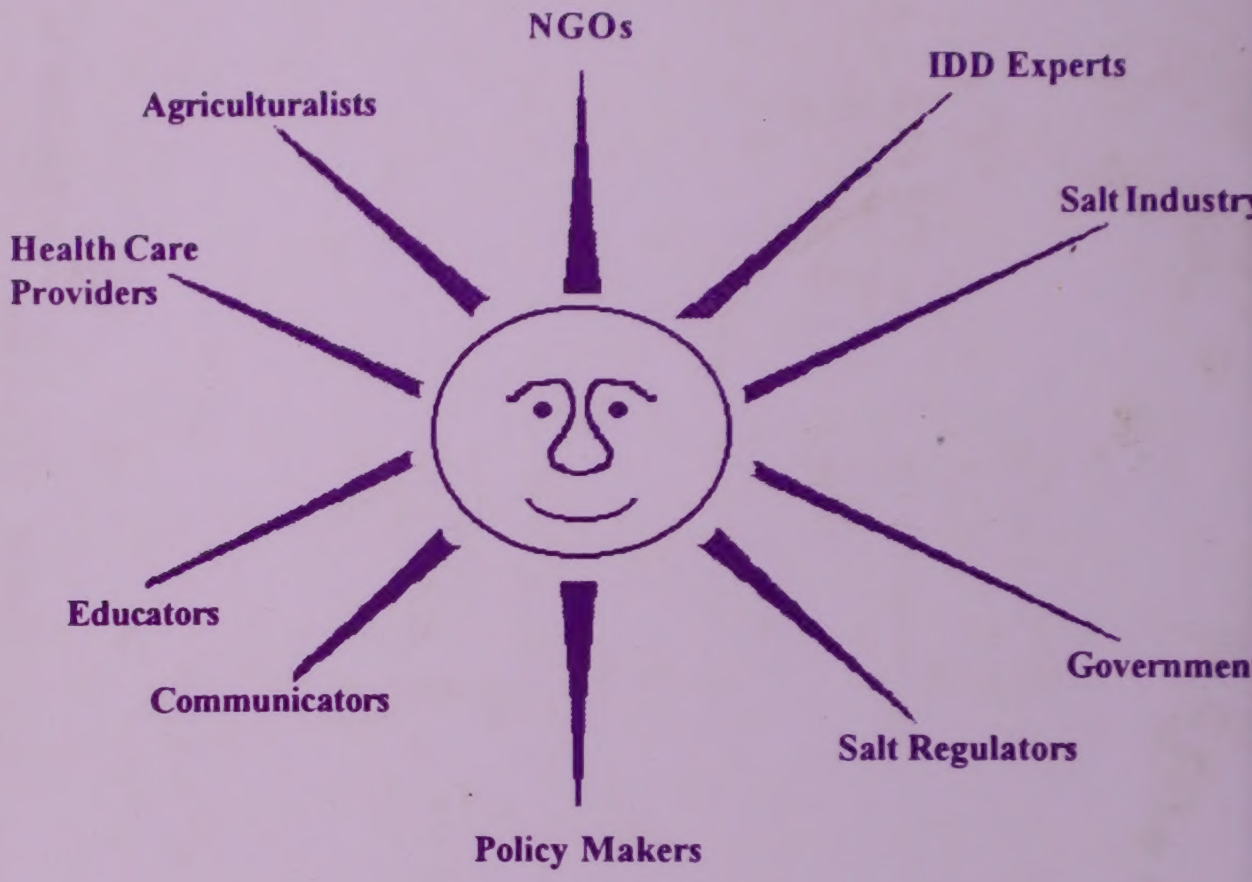
11.7. Item A.15.01 of Appendix B of PFA Rules 1954.

A.15.01.—IODISED SALT means a crystalline solid, white, pale pink or light grey in colour, free from visible contamination with clay, grit and other extraneous adulterants and impurities. It shall conform to the following standards, namely :-

Moisture:	Not more than 6.0 per cent by weight of the undried sample.
Sodium Chloride (NaCl)	Not less than 96.0 per cent by weight on dry basis.
Matter insoluble in water	Not more than 1.0 per cent by weight on dry basis.
Matter soluble in water other than Sodium Chloride	Not more than 3.0 per cent by weight on dry basis.
Iodine content at—	
(a) Manufacture level	Not less than 30 parts per million on dry weight basis.
(b) Distribution channel including retail level	Not less than 15 parts per per million on dry weight basis.

Provided that table iodised salt may contain aluminium silicate as on anticaking agent to a maximum extent of 20 % by weight:

Provided further that the total matter insoluble in water in such a case shall not exceed 22 % and sodium chloride content on dry basis shall not be less than 97.0 % by weight.



Sustaining Elimination of IDD

ICCIDD

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